

Abstract of Contribution 371

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Symposium

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Cognitive and motor development in and through sports and physical activity

Chair(s): **Lisa Musculus** (German Sport University Cologne, Germany)

This symposium aims at a better understanding of cognitive and motor development, by addressing children enrolled in sports and physical activity. In particular, this symposium sheds light on the role of cognitive and motor functioning development for (sports) performance and health-related quality of life during childhood. Deepening the scientific knowledge on the topic is important from a theoretical and applied perspective: Developmental studies can specify theories with respect to cognitive-motor and performance or health interactions. In the applied field, cognitive and motor functioning assessed early might predict future (sports) performance, health, and well-being.

The presentations cover a broad range of methods (intervention, (quasi-)experiments, age-group comparison, systematic review), age (preschool-aged children, children, adolescents) and samples (preschoolers, Pediatric-Cancer-Survivors, athletes). In particular, Spyridoula Vazou presents an intervention study evaluating the "Move for Thought preK-K". In preschools, this programme offers movement games integrated with academic concepts, executive function, and social-emotional skills. Valentin Benzing highlights the role of motor coordination in a study focusing on executive functions, motor abilities, and health-related quality of life in Pediatric-Cancer-Survivors. Elisa Bisagno presents two studies with female volleyball players on the role of working memory capacity and executive functioning for motor learning for performance in volleyball. Lisa Musculus brings together developmental and sport studies addressing predecisional processes to provide a more complete picture of decision-making process development during childhood in a systematic review.

Together, the talks provide an integrative overview of cognitive and motor development and allow coaches, teachers, educators, and parents to draw conclusions for their work.

Presentations of the Symposium

Integrating physical activity in preschools: targeting executive function skills through the Move for Thought preK-K programme

Spyridoula Vazou

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Despite a widespread belief that young children are very physically active, research shows that children in preschools mostly engage in sedentary activities with limited opportunities for structured PA or motor skill development. A growing body of research indicates that integrated physical activity (PA) with academics in the classroom benefits children both physically and cognitively and the benefits are stronger when exercise is embedded in an engaging context. However, preschool curricula with cognitively engaging PAs are scarce. Thus, the "Move for Thought (M4T) preK-K" programme provides movement games integrated with academic concepts, executive function, and social-emotional skills in the preschool environment. The purpose of the project was to evaluate the feasibility and effectiveness of the M4T preK-K programme over an eight-week period in 16 preschool centers (8 intervention, 8 control; N=257 3-5 years old children). Teacher ratings of students' attention and behavioural control in the classroom, as well as social skills, were collected before and after the intervention in both groups. A daily teacher log was used to measure intervention fidelity and perceptions about the experience with the programme. Results showed a significantly larger improvement on attention and behavioural control for the intervention group, compared to the control group. No significant differences emerged for social skills. Further, the program was easy to implement in the preschool classroom and highly enjoyable for both students and teachers. The M4T preK-K programme is promising in helping teachers prepare preschool children for future educational success by integrating PA with executive function skills and academic concepts.

Executive functions, motor abilities and quality of life in pediatric cancer survivors – the crucial role of motor coordination

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Due to the improved treatment and diagnosis, survival rates for pediatric cancer have increased by over 80%. Nonetheless, Pediatric Cancer Survivors (PCS) bear a high risk for late effects within cognitive functions, such as the executive functions (EFs). In typically developing (TD) children, EFs are related to motor abilities, and they contribute to the development of the physical self-concept which is important for psychological wellbeing. Therefore, the aim of this study was to investigate EFs, motor abilities, physical self-concept and health related quality of life (HRQOL) in PCS.

In total, 81 PCS and 55 TD children and adolescents between 7-16 years of age (M = 11.14; SD = 2.35) participated in this study. EFs were assessed using the Stroop (inhibition, shifting) and the Corsi task (updating); motor abilities using the German Motor Ability Test (fitness, strength, coordination). In addition, Physical Self-Description Questionnaire (PSDQ-S) and the Kidscreen-10 were used to assess physical self-concept and HRQOL.

PCS showed a lower performance in EFs and in motor abilities ($p < .0005$), and both were found to be correlated ($r_s > .315$, $p < .005$). PCS had lower physical self-concept in the facet of coordination ($p < .0005$), which also significantly mediated the relationship between actual coordination performance and HRQOL.

In conclusion, the assessment of motor abilities, and in particular motor coordination, should be included in standard aftercare in PCS. Results indicate that physical exercise interventions are warranted, and are also likely to impact HRQOL via improvements in physical self-concept.

The role of working memory in motor learning and sports performance: two studies with young volleyball players

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These studies aimed to testing the role of working memory (WM) capacity (Pascual-Leone, 1987; Pascual-Leone & Goodman, 1979) as general cognitive ability in motor learning (Study 1) and sports performance (Study 2) in volleyball.

105 young female volleyball players (5-17 years old and a group of “experts”, i.e., adults with at least 10 years of volleyball experience) took part to Study 1. Participants were engaged in WM and practical tests of volleyball of increasing difficulty, defined through a task analysis and scored in terms of “correct execution” and “precision”. Furthermore, each athlete was asked about his volleyball experience, in terms of years of practice and trainings per week. The best predictor of the “correct execution” ($R^2=.74$) was the WM capacity ($\beta=.55$), while for the “precision” ($R^2=.20$) the years of volleyball experience were the only significant predictor ($\beta=.45$).

In Study 2, 114 female volleyball players (11-18 years old) were engaged in WM and Executive Functions (Updating, Shifting and Inhibition: see Miyake et al., 2000) tests and completed self-report measures on their attentional style and the emotions they experienced before competitions. Moreover, they were video-recorded during at least three competitions and an efficiency index was calculated by two judges (inter-rater agreement: $r=.84$; $p<.001$). Among a set of six cognitive and four emotions-related predictors, only a composite “WM-updating” index was found significant ($\beta=.35$) in predicting volleyball players’ performance ($R^2=.15$) in a stepwise regression. Therefore, WM can be considered a predictor not only for motor learning, but also for performance in volleyball.

What happens before and when children decide? A systematic review on the development of decision-making processes

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Making a decision in sports games is quite a hard task, especially for a young player, because before making the decision, he/she needs to generate options. These predecisional processes are of crucial importance but are most of the time neglected. By taking a developmental perspective we addressed the interplay of predecisional process and selection aim to deepen our understanding of how cognitive decision-making processes develop during childhood. To get a complete picture of how decision-making processes develop, we conducted a systematic literature review (PRISMA) including studies from sport and developmental psychology. Studies involving children and addressing predecisional processes (i.e., option generation, information search) were included. Ecological rationality served as a theoretical framework because it covers predecisional processes and has been applied in both fields. In particular, the results were interpreted with respect to the person- (i.e., developmental changes, age effects, expertise effects) and environment-level (i.e., tasks conducted, stimuli used, manipulations) effects.

A total of $N = 21$ empirical studies were included in the review. The studies were systematically compared (i.e., integrated and differentiated) with respect to the methodological design and the results were qualitatively reinterpreted through the ecological rationality framework. First, person-level effects of age and expertise on quality of the first option, number of options generated and quality of the decisions were comparable in developmental and sport studies. Second, environment-level effects of task-complexity differed between developmental and sport studies. The results allow future tests of decision-making models and specific theoretical predictions on what happens before and when children decide.